

ABSTRACT OF THE DISCLOSURE

[0050] Significant amounts of micromasking residue have been observed at the interface between a Ti-containing ARC layer and a PE-TEOS hardmask after the hardmask has been etched and prior to the use of the etched hardmask for transferring a pattern to an underlying metal layer (e.g., aluminum). The micromasking residue can interfere with proper etching of the underlying metal layer such as by creating undesirable short circuits between metal interconnect lines. Methods are disclosed for removing and/or preventing the formation of the micromasking residue. A removing method includes the use of a relatively low average-mass physical bombardment agent in combination with a small-diameter, chemically-reactive agent for dislodging micromasking nodules by weakening their base anchors and breaking them away without causing excessive damage to underlying layers. In one embodiment, the base anchors are rich in titanium content while the micromasking nodule bodies contain titanium oxide. Chlorine is included in a residue removing plasma for volatilizing the titanium of the base anchors while argon is further included in the residue removing plasma for physically bombarding the upper, oxide bodies of the micromasking nodules. A method for preventing or reducing the amount of formed, micromasking residue includes interposing an oxygen-poor interfacial layer between the metal-containing ARC layer and the oxygen-containing hardmask.
